

Strategies for implementing curriculum change

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This is the fourth in a series of articles examining the problems in medical education and their possible solutions

The General Medical Council has announced that British medical education must change,¹ but what strategies can be used to implement the desired reforms? Most people accept that the way in which a subject is taught can have as much impact on what students learn as the content of the course. A recent review by the Oxford Centre for Staff Development identified five aspects of educational programmes that are associated with students adopting undesirable shallow learning techniques and failing to grasp the underlying principles of the topic.² The five features are heavy workload; excessive amount of course material; little opportunity to pursue subjects in depth; little choice over topics or methods of study; and an anxiety provoking assessment system that rewards or tolerates regurgitation of factual information.

Dr Reg Jordan, the academic subdean at Newcastle medical school, likes to quote these points when talking about medical education because people inevitably assume that they are describing the traditional British medical course. In fact, none of the studies on which they are based was of medical education, although there is no reason why the general principles should not apply more widely. Many of the strategies that have been used to implement change in medical curricula are designed to tackle such problems with the traditional course.

Much discussion about curriculum strategy is couched in educational jargon that may exclude many people from debates about the best approach. There is also a danger that people will become obsessed with the processes and forget the underlying aims. This danger has been highlighted by Professor Ron Harden and his colleagues at the Centre for Medical Education at the University of Dundee. They warn that too often the strategic concepts become "a thin gold veneer to a curriculum package" or come to be "ends in themselves, while the real aims and purposes of the curriculum are forgotten." In an attempt to encourage schools to think about why they are adopting certain approaches the centre has developed a model for curriculum design based on six key strategic concepts.³ The "SPICES" model represents the innovative extremes of six spectra (fig 1), and staff should consider the pros and cons of each extreme before deciding what approach works best in their setting. I shall now use the SPICES model to look at some common strategic approaches to change in medical education.

Student centred learning

Many traditional medical courses are essentially teacher centred, with staff defining the objectives for the course, the course content, the learning resources and teaching methods to be used, and the pace of teaching and methods of assessment. In a student centred system, however, the students take on much of the responsibility for these tasks. At its most extreme a student based course may follow the lines of the medical course at McMaster University in Ontario, Canada. There the students learn in small groups with a member of staff available to advise if required but taking no part in selecting what or how they learn. The students are given a choice of clinical problems to

tackle, and it is up to them to decide which aspects to pursue. They are responsible for defining the objectives of each new topic and choosing what resources to use in studying it. They may, for example, decide to work in the library or resources centre, or they may call in a clinical expert to give a tutorial to the group.

Less extreme approaches to shifting the focus on to students and away from teachers include simple changes like ensuring that formal teaching occurs at times and in settings that are convenient for the students, rather than being designed solely to fit in with staff commitments. This is especially important in postgraduate medical education, when students are under considerable pressure from the service aspects of their jobs. People do not learn well when they are tired or risk being interrupted to attend to other matters, and ensuring that teaching is geared to fit in with their other commitments makes it much easier for them to take full advantage of it. The Standing Committee on Postgraduate Medical Education has emphasised such potential benefits of a more student centred approach.⁴

Student centred learning is thought to increase motivation and enhance learning by shifting the emphasis from what is taught to what is actually learnt. It is also seen as a good preparation for continued learning beyond the confines of a formal course. There are disadvantages, however, and among these Professor Harden identifies the facts that student centred learning can be difficult to coordinate and administer; teacher centred approaches are often the most cost effective way of imparting a body of factual information to a large group of students; many teachers have not been trained in the special facilitating skills needed to assist in student centred learning; and unless students are familiar with how to direct their own learning they can be left floundering.

Problem based learning

In the past British medical schools have tended to concentrate on teaching facts which doctors then have to learn to marshal as required to tackle the problems that they face in clinical practice. The GMC has stated that we should move away from this approach and introduce a large element of "problem based learning" into the undergraduate curriculum.¹ The idea behind problem based learning is that students are presented with a real clinical situation and use it as a springboard from which to explore various topics. An elderly woman who falls and fractures her leg may, for example, form the basis for learning about the anatomy of the lower limb, the physiology of bone healing, the epidemiology of osteoporosis, the risks of immobilisation in the elderly, the pharmacology of acute pain relief, and the social consequences of disability (fig 2). The hope is that this will feel more realistic than the traditional approach, so encouraging students to remain enthusiastic about what they are doing, and that it will be easier for them to recall what they have learnt because the service setting will be similar to the setting in which the facts were originally learnt.⁵ Several new medical schools have based their courses almost entirely on problem based learning—the most

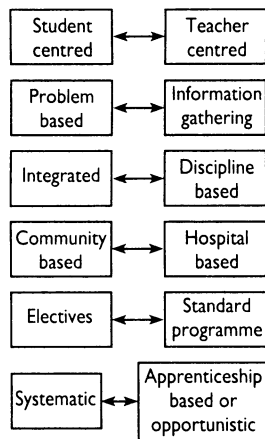


FIG 1—"SPICES" model of curriculum design

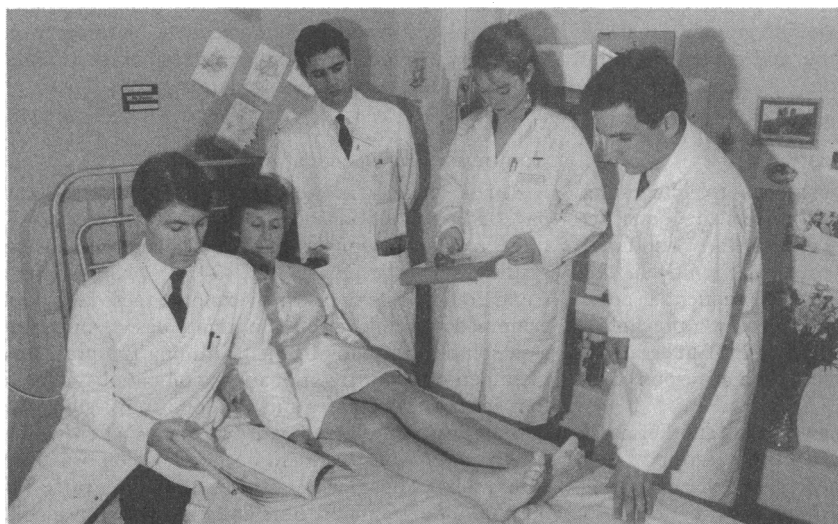


FIG 2—Problem based learning: students presented with real clinical situation facilitating exploration of other topics

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well known being McMaster in Canada, Maastricht in the Netherlands, and Newcastle in Australia.

Problem based learning fits in well with integrated approaches, in which students study various aspects of a problem simultaneously (see below), and also works well in self directed learning programmes where the students choose which aspects of a problem to tackle. In McMaster, for example, the clinical problem outlined above might be presented to a tutorial group, but it would be up to the students themselves to identify the possible learning opportunities it presented and decide which of them to explore and in what detail. Because some of the most vocal advocates of problem based learning have been the new innovative schools like McMaster there is a tendency for more traditional schools to assume that this is an approach that can be adopted only as part of a package including strategies like self directed, or small group, or integrated learning. This is not necessarily so, and Dr Luis Branda, chairman of the programme for faculty development at McMaster, emphasises that elements of problem based learning can be incorporated into various types of curricula.⁶ In fact, many doctors teaching in British hospitals use a problem based approach every day, although they may not think to call it that.

Relation with problem solving

A common difficulty when people talk about problem based learning is the assumption that it is the same as "problem solving." This is not so, and indeed if the aim was to solve clinical problems there would be limited applications of a problem based approach to teaching very inexperienced undergraduates. As people progress through medical training and acquire more knowledge and experience they may "solve" some of the problems that they encounter, but the aim of problem based learning is to provide a framework for teaching and learning, not to arrive at the correct solution.

Some exponents of problem based learning suggest that it is a good way of developing the problem solving skills that a doctor will need in clinical practice.³ But there is little evidence that this is so. The development of clinical reasoning skills was studied in a random cross sectional sample of medical students from three years of the course at McMaster and a separate group of students from a single year, who were studied longitudinally throughout the course.⁷ The students were observed in the clinical examination of a simulated patient, and their underlying reasoning processes were explored during subsequent review of the videotaped consultation.

Although the diagnostic and management skills

of the students improved as they progressed through the course, there was little change in the processes they used to reach their conclusions. The authors concluded that despite the problem based approach to medical education at McMaster, the students did not develop problem solving skills. They simply acquired more knowledge, which allowed them to make more sensible hypotheses about what was going on.

This may, of course, be a reflection of the setting of the study. Students at McMaster are carefully selected for their skills at self directed learning and may be already good at problem solving.⁸ A problem based course might help students who do not already have well developed problem solving skills to acquire them. Dr Colin Coles, an educational psychologist from Southampton, thinks that problem based learning encourages students to adopt desirable deep learning approaches (in which they acquire an understanding of the underlying principles of a problem rather than simply memorising superficial facts about it). Coles carried out a longitudinal study of students at two medical schools, one with a conventional curriculum and the other with a problem based approach. On entry the two groups had similar learning styles, but after only one year those in the conventional school showed a significant shift in their learning styles towards shallow techniques with emphasis on the rote learning of facts, while the students at the other school had maintained their desirable deep learning attitudes.⁹

Integrated courses

The traditional British medical course, as described in part I of this series, was clearly separated into preclinical and clinical sections.¹⁰ Within each section topics were further divided by subject, discipline based departments taking on responsibility for teaching small, unconnected sections of the course. A recurrent criticism of this approach is that students fail to appreciate the relevance of what they learn in one part of the course to other aspects of the whole curriculum. Anecdotally this is widely recognised, most doctors admitting that they cannot remember much of what they learnt in the basic science courses at medical school. A survey of students and graduates at St Bartholomew's Hospital, London, confirmed that they thought much of the preclinical teaching was irrelevant, and the concept has also been accepted by organisations like the GMC and the King's Fund in their statements on the medical curriculum.¹¹

Part of the problem is undoubtedly the overload of the medical course. Much of what is presented in preclinical courses is irrelevant to what a doctor really needs to know. Dr Reg Jordan, from Newcastle, believes that curriculum designers should be brave enough to state clearly what students don't need to know, as well as what they should know. Dr Chris McManus, from St Mary's Hospital Medical School, London, points out that most students who fail in medical courses do so in the preclinical years, when they are essentially studying courses and sitting exams that have been designed by non-medical staff. He questions whether these teachers should have such a large say in who does or does not become a doctor.

Some schools have gone a considerable way to reducing the content of the medical course, especially in the preclinical sciences. But there is still a problem that students also tend to forget the facts that are relevant to what comes later. Dr Colin Coles, from Southampton, emphasises that we tend to learn best when we learn in context. Facts are remembered most easily in a setting similar to the one in which they were learnt—a simple example being the difficulty we may have in putting a name to a familiar face met out of the

usual setting. These notions have led increasingly to calls for the medical course to be integrated so that the traditional boundaries disappear and students see the relevance of what they are doing.

Horizontal and vertical integration

There are two major approaches to integrating medical courses, although the underlying concepts are similar. In horizontal integration the boundaries between parallel parts of the course are removed, and in vertical integration those between sequential areas are lost. The changes in St Bartholomew's preclinical course are a good example of horizontal integration, with loss of the traditional departmental responsibilities for sections of the course.¹²

The systems approach at Newcastle is another good example of integration—students learning the anatomy, physiology, and biochemistry of each major organ system together. The Newcastle course also illustrates the principle of vertical integration; here students learn the clinical aspects of the organ systems at the same time as they learn underlying science.¹³

Professor Ron Harden's team in Dundee identifies several advantages of integrated teaching in medicine. For example, students are more motivated by seeing the relevance of what they are doing and more likely to remember what they learn because they are learning it in context. In addition, because they are learning about all aspects of a problem at the same time they are automatically adopting a holistic approach to clinical problems, which fits well with modern ideas about treating patients as whole people living in a community and not just as examples of particular disorders.¹ Integrated courses also encourage cooperation between staff from different departments and avoid wasteful duplication and repetition of effort by better coordination of the whole course.

There are some disadvantages, however. Unless great care is taken over coordinating the course important topics may be overlooked. Dr Reg Jordan believes that "the first step in integration is coordination," but this can be cumbersome and expensive, and discipline based teaching may simply be easier to set up.

Practical difficulties

There may also be practical restrictions on the amount of integration that is possible. At Newcastle it was fairly easy to provide vertical integration because the medical school has access to many hospital sites and a large number of willing clinical teachers. Mr Brian Jolly points out, however, that at St Bartholomew's there is limited scope for vertical integration because the teaching site for the basic sciences course at Queen Mary College has access to only one hospital, at Mile End. Reg Jordan thinks that there is no single solution to the problems in medical education that will be a panacea for all schools and emphasises that changes should take note of local contexts, including any historical and geographical considerations. Some schools may find it impossible to set up a fully integrated course from day 1 but might, for example, make use of a wedge structure in designing the curriculum so that both preclinical and clinical subjects are taught throughout the course, but with preclinical studies predominating in the early years and time devoted to clinical subjects increasing as the course progresses (fig 3).

Many teachers may find it hard to teach on an integrated course, and some of their enthusiasm may be lost if they do not feel that they are teaching their own subject. A preliminary assessment of the new horizontally integrated basic sciences course at St

Bartholomew's has identified that staff find it difficult to set a truly integrated exam and that questions from various disciplines are juxtaposed rather than integrated (B Jolly, personal communication).

Community based education

Recent changes in the provision of health services have led to increasing questions about whether traditional teaching hospitals are the best places to educate medical students. On 10 July 1992 the King's Fund Centre ran a conference which explored these ideas and examined the concept of community based education as a solution to many of them. Among the problems identified with our traditional hospital based system is that economic pressures and the opportunities created by modern technology mean that many patients now receive all of their treatment outside hospital or in day case units. Those who are admitted are often in hospital for a very short time and may not be available for teaching preclinical students about common conditions. Much of what goes on in hospitals now is so specialised as to be of limited use to undergraduate students anyway.

A possible solution is to move much of medical education into the community. Dr Nigel Oswald, from the department of general practice at Cambridge University, is a great advocate of this approach.^{14,15} He emphasises that community based teaching is not about teaching general practice. It is a way of teaching general medicine in the community. In 1993 a group of four students at Cambridge will take part in a pilot project of 15 months of community based education in place of the traditional junior medical and surgical attachments and specialty rotations.

Seeing care in context

Among the perceived advantages of community based teaching is that students see patients in their own environments and get a clear understanding of how illness affects all aspects of a person's life. This is in line with recent calls from the GMC for undergraduates to study health and disease "in the context of the whole individual in his or her place in the family and society." Students also learn about how health services are provided, the importance of a team approach, and how primary and secondary services interact. They get a better idea of the relative importance of various conditions for the whole community and have more exposure to the health promotion and disease prevention aspects of medicine that the GMC wants emphasised in the undergraduate curriculum.¹

There are, however, some advantages of a hospital based course. The organisation is much simpler—a major problem with community based teaching is that students must learn in small groups and there are numerous logistic problems in ensuring adequate accommodation, transport, and support services for them when they are widely scattered from the school base. When the Cambridge scheme starts next year, for example, only students with their own cars will be able to volunteer, as others might not be able to visit patients at night, attend outpatient clinics, or follow patients to casualty departments as required. Students may actually resent the loss of a group identity when they are farmed out in small groups away from their medical schools. There may also be difficulty in recruiting enough suitable tutors to supervise students in the community, although Dr Oswald points to the enthusiasm with which general practitioners have found places for postgraduate trainees as evidence that this can be overcome. Whether or not the system could cope with large numbers of undergraduate students remains to be seen, especially as they would need

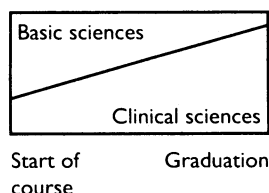


FIG 3—Wedge approach to vertical integration

supervision and tutoring on a broader base than merely the general practice aspects of a case.

Electives

One of the most radical proposals in the latest consultation document issued by the education committee of the GMC is that we should move away from our traditional approach of all students studying the same course and introduce a system of a common "core" with "options."¹ The main aims behind this idea are the need to reduce the factual load in the curriculum and the desire to encourage students to develop skills in learning for themselves. The GMC now regrets the choice of the term "options," because of its connotation as something non-essential. Perhaps it would have been better to go for the term "electives" as used in Professor Harden's SPICES model.

Whatever term is used, the purpose of an elective period of study is to give students an opportunity to pursue personal interests outside the confines of the core course. This may be an opportunity to study in depth some aspect of the core that particularly interests a student, or it may be a chance to tackle a topic that would not otherwise feature at all in the undergraduate course. Not only does the use of elective study allow the course to be broadened to suit individual interests; it also encourages students to take on responsibility for designing their own learning agenda, pursuing new sources of information, and deciding how much they want to learn about a topic.

Like most other strategies, however, electives have their disadvantages. Among other things Professor Harden's group identifies the pressures that staff can experience in trying to coordinate extensive elective programmes for large numbers of students, the difficulties of ensuring adequate supervision for a huge range of topics, problems in motivating staff to get involved in what can be seen as "the students' project," the danger that unless timetabling is carefully controlled electives can interfere with students' attention to the core subjects, and the difficulties in assessing students' performance on electives, given the vast range of agendas set and topics covered.

Systematic curriculum design

The traditional approach to medical education, especially on the clinical course, has been along the lines of an apprenticeship. Students were allocated to a clinical firm and saw patients as they were admitted to the ward. Little overall planning could be done because it was impossible to predict which patients would be available at any given time. The assumption was that students would eventually be exposed to an acceptable range of conditions. Increasingly the acceptability of this approach is being questioned, and in summarising the problems with opportunistic curricula Harden *et al* emphasised the growing feeling that medical schools should be accountable to the public for the quality of the graduates from medical courses.² This means that the content of the course cannot be left so much to chance.

The situation is further compounded by increasing specialisation in hospitals. The traditional "general" medical and surgical firms are now few and far between, and the chances that students will see an acceptable range of common conditions during a six month attachment to a hospital firm is much less than previously.

However desirable it may be to introduce some

formal planning into the undergraduate experience, it is actually hard to implement a fully systematic approach to medical education. For one thing it is administratively easier to allow teaching to fit in with the way we provide services in our hospitals. While service provision remains essentially firm and specialty based it is hard to provide clinical teaching based on a different structure. (This may, of course, be another reason to look carefully at placing more emphasis on community based teaching, with students attending hospitals only when their own patients do so.)

Another problem about introducing a completely systematic approach is the need to have clinical cases available to illustrate relevant aspects at specific points in the course. Timetabling a section on thyroid disease for a given week is pointless unless suitable patients are available at that time. Two possible solutions are to introduce more cooperation between firms, so that students have access to a wider pool of patients at any given time, and to make more use of simulated patients. These are healthy people who have been trained to mimic the presentation (including physical signs on examination) of specific medical conditions.³ They are used extensively in North America for undergraduate teaching, but in Britain they are less common.

Conclusion

The SPICES model illustrates how many factors can be taken into consideration when designing or changing a curriculum. Contrary to popular belief, changing medical curricula is not an "all or nothing" process, and planners should select those approaches that work best in their specific setting. In fact, Professor Harden thinks that "it is inherently unlikely that a position at either extreme end of the [SPICES] spectrum is appropriate." Many innovative schemes in medical education are described in jargon terms that make them sound quite out of the ordinary. But most medical teachers are already using problem based, self directed, small group, and integrated approaches as part of their teaching and doubtless have useful comments to make about when such approaches are helpful. We should ensure that people are not excluded from the current debates because they do not recognise the simple concepts behind the jargon phrases.

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